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Newfoundland 2000 Shellfish RAP Proceedings

February 29 to March 2, 2000 and March 8, 2000

G. P. Ennis, Chairperson

Fisheries and Oceans Canada
Science, Oceans and Environment Branch
Fisheries and Oceans
P. O. Box 5667
St. John's NF
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ABSTRACT

Newfoundland Region conducted assessments of northern shrimp, snow crab and Iceland scallops in February and March 2000. Summaries of the working papers presented along with ensuing discussion are provided here. Also included as appendices are lists of papers and other documents available to the meeting, participants, and briefing notes prepared following the meeting. Additional information on the resources assessed is available in CSAS research documents and stock status reports.

RÉSUMÉ

La Région de Terre-Neuve a procédé à des évaluations des stocks de crevette nordique, de crabe des neiges et de pétoncle d'Islande en février et mars 2000. On trouvera dans les présentes des sommaires des documents de travail présentés, ainsi que des discussions subséquentes. On trouvera aussi en annexe une liste des participants, des communications et autres documents disponibles à la rencontre et des notes de synthèse préparées subséquemment. Des renseignements additionnels sur les ressources évaluées sont aussi disponibles dans les documents de recherche et les évaluations des stocks du SCES.

INTRODUCTION/SUMMARY

Regional assessments of northern shrimp (*Pandalus borealis*), snow crab (*Chionoecetes opilio*), and Iceland scallops (*Chlamys islandica*) were conducted in February and March 2000. These proceedings contain summaries of the working papers presented at the meeting, as well as summaries of the discussions of these papers. Information on oceanic conditions during 1999 in comparison to long term norms was also presented. A list of working papers and other documents available to the meeting is included in Appendix I and a list of meeting participants is included in Appendix II.

For the northern shrimp fishery, 1999 was the last of a 3-year management plan. A full review was conducted and a new SSR produced. The briefing note prepared is included in Appendix III. Use of a "traffic light" evaluation of the resource, introduced in last year's RAP as an initial step in implementation of the Precautionary Approach, was continued and included in the SSR. Shrimp continue to be distributed widely throughout Div. 0B to 3K at a high level of abundance.

For the snow crab fishery, 1999 was the first of a 3-year management plan developed following last year's RAP and new SSR. Survey results indicating a decline in abundance in 1999 triggered a full review and a new SSR. The briefing note prepared is included in Appendix III. As with shrimp, use of a "traffic light" evaluation of the resource was continued and included in the SSR.

For the Iceland scallop fishery, 1999 was the second of a 3-year management plan. An interim review was conducted and an updated SSR produced. The briefing note prepared is included in Appendix III. There was a very substantial decline in landings associated with resource depletion and diversion of effort onto shrimp and crab.

For additional information on these resources, see references provided in the SSRs, check the CSAS research document series, or consult with authors listed in Appendix I regarding status of documentation.

DOCUMENT SUMMARIES AND RELATED DISCUSSIONS

Shrimp

Reference

WP SF 2000/01 Bycatch of Greenland halibut in the offshore northern shrimp fishery by D.C. Orr, D.W. Kulka, P.J. Vietch and J. Firth.

Summary

Analyses of bycatch in the shrimp fishery made use of the 1997 - 1999 offshore observer databases. Distribution plots indicated that juvenile (<=24cm) Greenland halibut were common throughout the entire study area, but were most abundant in the Hopedale, Cartwright and Hawke Channels, as well as on the shelf in waters shallower than 200 m. Offshore shrimp fishing vessels concentrated their effort within these channels and along the shelf edge. However, less than 2% of any Greenland halibut cohort was taken by this fleet. This rate of removal was considerably lower than the estimated natural mortality of 58% during each of the first 5 years of life. The number of Greenland halibut taken was proportional to year class strength. The highest losses occurred in 1997 while the 1995-year class was still abundant and small enough to pass through the spaces in the Nordmore grate. Hypothetical losses of yield ranged from 197 - 450 tons over the 17-year Greenland halibut lifespan.

Discussion

It was suggested that a historical perspective would demonstrate significant bycatch decreases resulting from use of the Nordmore Grate. It was agreed that better observer coverage for the inshore shrimp fleet was required and that the Dockside Monitoring Program database could also be used to gain further insight into this bycatch issue.

Reference

WP SF 2000/02 Discards of shrimp in the northern shrimp fishery by D. C. Orr.

Summary

This paper provided percentages (in terms of tons) of *Pandalus borealis* and *P. montagui* discarded over the past 3 years by SFA, species and fleet. In all cases, less than 2% of the shrimp were being discarded.

Discussion

It was suggested that since the analysis made use of observer data only, it did not give a true indication of discarding by the inshore fleet because of limited coverage. Industry felt that the DMP database would provide better information for this fleet.

Reference

WP SF 2000/03 Comparison of methods for constructing abundance-at-length estimates for shrimp from research trawl surveys by D. G. Parsons.

Summary

OGMAP was adapted for length-based analyses. Various comparisons between STRAP and OGMAP indicated that population estimates by length were virtually identical.

Discussion

It was agreed that OGMAP had several advantages over STRAP and therefore should be used in the future.

Reference

WP SF 2000/04 Assessment of shrimp in Hawke + 3K (SFA 6) by D. G. Parsons et al.

Summary

Catches within SFA 6 have increased 5 fold since 1994. The 1999 season was the only one in which the TAC was not taken. The CPUE index is determined by the General Linear Modeling (GLM) Procedure within SAS in which effort is weighted taking year, month, vessel and area into account. Due to the addition of data there is a new analysis each year. Additionally, past errors in SFA boundaries meant that corrections had to be made to the indices, however, these had only a minor impact upon the index. The CPUE indices rose dramatically from the 1980's until 1995 and then stabilized.

The mean size of females and the size at sex inversion based on commercial sampling data from offshore vessels have declined since 1996, indicating a possible change in growth. It should be noted that the reproductive potential has probably been maintained through a high abundance of females. The weak 1996 year class is followed by stronger 1997 and 1998 year classes.
In general, the resource is currently healthy with a high abundance of males and females. Recent increases in TAC's and catches approaching those levels have

not resulted in a decline in the stock and catch-to-survey biomass ratios were less than 11% in recent years suggesting low exploitation.

Discussion

The TAC was not reached mainly because of operational problelms for the inshore fleet. The fact that some quotas were not reached had nothing to do with a lack of resource or harvesting capacity.

There was a discussion of various factors that might affect the CPUE index. This included vertical migrations, the lack of data from the inshore fleet, and variation from year to year in spatial distribution of effort. The shelf edge has been fished more extensively since 1992. The offshore fleet concentrates its fishing effort on the edge during winters in which there is a great deal of ice. During spring and fall, effort shifts depressions on the shelf. In the southern areas effort is almost entirely due to the inshore fleet. Clearly, these factors have to be considered in evaluating the CPUE index.

Shrimp were small in 1999. In the past 70 to 90 count shrimp made up 25% of the catch, now these larger shrimp account for only 5% of the catch. The size at sex inversion has also decreased from 22.5 mm in 1994 to 21 mm in 1999. There is uncertainty as to why the size at sex inversion has been decreasing but it is not necessarily a bad thing. This decrease in growth rate could be related to higher densities or lower temperatures. Hatching is being observed in October and February, earlier than usually in May. This may be related to higher temperatures in recent years.

Reference

WP SF 2000/05 Assessment of shrimp in Hopedale + Cartwright (SFA 5) by D. G. Parsons et al.

Summary

This area is primarily fished by the offshore fleet with only 1500 t allocated to the inshore. The standardized CPUE index increased during the 1990's were similar for 1997 to 1999. It was noted that a minor error in the placement of the southern boundary resulted in minor changes to the catch and CPUE.

Over the past ten years the mean carapace length of females has decreased slightly from 23 to 24 mm. Mean size at sex inversion now occurs at 21 mm. The 1991 and 1994 year classes dominated in 1995 and 1999, respectively. The commercial and research length frequency data provide similar cohort patterns.

In the past, it was possible to distinguish SFAs 4 and 5 based on differences in growth and maturation. However, these two management areas are now similar

in terms of biology and fishery and this may be due to shrimp from SFA 5 moving northward.

In areas farther north it is more difficult to detect trends in survey data because sampling intensity is lower and the estimates are usually driven by one or two large sets producing broad confidence limits.

Overall stock structure is uncertain. Shrimp are distributed continuously from north to south, therefore the present management SFAs may not be realistic.

Stock status is currently favourable. Fishery and research survey data indicate that a healthy female stock will be maintained in 2000. No decline in stock was detected with the doubling of TAC and increased catches within the 1997 – 1999 Management Plan. Catch-to-survey biomass ratios ranged from 16 to 26% over the past three years. Lacking a recruitment index for this area, prospects beyond 2000 are uncertain.

Discussion

The offshore fishing captains agreed that the ramp counts within SFA's 5 and 6 were similar. It was agreed that we should start to look at the scientific basis for changing the SFA boundaries.

Reference

WP SF 2000/06 Assessment of shrimp in Division 2G (SFA 4) by D.G. Parsons et al.

Summary

Over the years there has been a stepwise TAC increase. The quota is divided into northern and southern portions. The 1998 and 1999 catch and effort data are preliminary. Effort has been relatively stable over the past five years. The catch for inshore vessels was 110 t while the rest was taken by offshore vessels. Catch rates have fluctuated without trend, since 1990, indicating some stability in the resource.

Biomass/abundance indices from 1996 – 1999 were imprecise with wide confidence intervals partially due to poor survey coverage. Therefore, the trends in stock size are uncertain from surveys and results must be interpreted with caution. Current exploitation rates are believed to be below 20%. The recent catches have had no observable impact upon the stock.

Discussion

The fishing captains indicated that almost all vessels operating in SFA 4 use windows and our indices should take this into account. The catch rate is considerably lower with windows.

There was a discussion as to whether 2G should be divided. One of the fishing captains felt that the southern portion of 2G should be a distinct fishery. In the past there was an argument for dividing 2G into a northern portion, which would be joined with 0B, and a southern portion that should be a part of Hopedale/Cartwright. The division should be based upon growth patterns. The large shrimp in the north are similar in size to those found in 0B while shrimp from southern 2G are similar in size to those from Hopedale/Cartwright. Throughout the discussion the Nunavut and Quebec land settlement boundaries were mentioned as being important in future decisions about SFA boundaries.

Reference

WP SF 2000/07 Assessment of shrimp in Division 0B (SFA 2) by D.G. Parsons et al.

Summary

No research surveys are conducted in SFA 2 and knowledge of the biology, distribution, abundance and exploitation of shrimp in the area are lacking. The CPUE has increased steadily from 1993 to 1998. A 3500 t quota was set for the area north of 63°N, however, only 100 t was caught. Fishery data alone cannot be interpreted as an indication of trend in the stock. Therefore, the prospects beyond 2000 are unknown.

Discussion

Industry expressed concern about the lack of research in SFA 2. The merit of the 63°N boundary was discussed at some length. Industry would like to see a change but a resolution of their issue with the present boundary was not obvious.

Crab

Reference

WP SF 2000/08 SF Assessment of the 1999 Newfoundland and Labrador snow crab fishery by D.M. Taylor, P.G. O'Keefe and P.J. Veitch.

Summary

Newfoundland and Labrador snow crab landings reached 69,000t in 1999, an increase of 32% over the previous year. The fishery is concentrated along the northeast and southeast coasts of the province with a small, inshore fishery, inshore fishery, inaugurated in 1995 operating in nearshore areas. The fishery is prosecuted by several fleet sectors; these include full-time, large supplementary (>40 gross tons), small supplementary vessels (<40 gross tons) and vessels under 35 ft. In 1999 approximately 3200 licences were issued to Newfoundland and Labrador fishers. Vessels are licensed by NAFO division boundaries and are restricted to fishing snow crab management areas within their division. Each year, before fishing activity commences, Resource Management Branch issues a Snow Crab Management Plan which outlines quotas per fleet sector by management area, trap limits, seasons etc. and describes intra-area boundaries which serve to segregate fleet sectors.

Assessment of fishery performance for fleet sectors fishing each management area relies on analyses of fishers' logbook entries (mandatory for all fleet sectors) as the principal means of comparing a given year's fishery performance to that of the previous fishing season or a time-series of fishery performance data. The standard used in this comparison is catch per unit of effort (CPUE) calculated by dividing the landings for a trip by the number of reported trap hauls. Generally, all the landings for a fleet sector in a given management area are divided by the total reported effort to give a seasonal CPUE. For the assessment of the 1999 fishery CPUE'S were calculated on a bi-weekly basis as well as seasonally in order to obtain a better understanding of seasonal trends. These bi-weekly catch rates were compared with those of 1998 in order to determine significant changes between seasons. While it is felt that information obtained from most logbooks during the course of a fishery is reasonably accurate, providing reliable data on catch and effort, some management areas are problematical. This was particularly true of the 3Ps fishery in recent years. To remedy this situation an Index Fisher program recruiting a core group of responsible fishers to provide fishery was initiated in 1999. This program was expanded to the NAFO Division 3L Temporary Seasonal (<35 ft.) fleet sector under the auspices of the Fish Food and Allied Workers union.

Changes in CPUE from one year to the next may not accurately reflect commercial abundance due to influences of such things as environmental effects (water temperature), changes in fishing patterns (soak times and gear configuration) and changes in fishing patterns etc. Comparison of CPUE of

recent years and those calculated pre-1996 are particularly problematical for several reasons. In 1996 a two-tiered pricing system was introduced whereby fishers were paid a higher price for crabs greater than 101 mm carapace width. This industry policy led to high-grading at sea which presumably artificially reduced CPUE's. Additionally, in recent years fishers, particularly those in NAFO Division 3LNO, increased the mesh size of their traps and have begun to deliberately soak their traps for longer time periods in an effort to reduce the catch of sub-legal and legal-sized crabs that are less than 102 mm carapace width. These fishing practices may also have reduced commercial CPUE. Despite these efforts to reduce on-board culling at-sea observers reported a continuing problem of poor handling practices on many vessels contributing to high discard mortality rates.

Logbooks have been utilized to determine fishing positions of crab fishers with the aim of summarizing fleet fishing patterns, identifying portions of the fishing grounds that are most heavily fished, delineating the boundaries of new fishing grounds and illustrating the expansion of the fishery in recent years both in terms of effort and area. A large sub-sample of the log book entries of full-time and supplementary fishers is used to create a computer-generated map of Newfoundland and Labrador delineating the commercial fishing grounds. To date, figures illustrating fishing positions for the 1994-99 seasons have been produced.

Discussion

The utility of the recent practice of comparing overall commercial CPUE data for different management areas was questioned. Overall catch rates for offshore commercial crab grounds did not reflect the results of the multi-species trawl survey. While CPUE's in areas 2J and 3Ks were down slightly from 1998 levels they in no way demonstrated the marked reduction in commercial biomass indicated by the trawl survey. A reanalysis of commercial CPUE data whereby by-weekly catch rates from 1998 were compared with those for 1999 showed that in 1999 the decline in CPUE in 2J and 3Ks over the fishing season was much steeper in 1999 than in 1998. This same methodology was applied to 3L and 3Ps fishery data but did not support the findings of the offshore trawl survey. The implementation in 1999 of an index fisher program in 3Ps and 3L inshore areas was noted.

Reference

WP SF 2000/09 Summary of the results of 3 inshore/nearshore snow crab trapping/trawling surveys by D. M. Taylor, P.W. Collins and P. G. O'Keefe.
Summary

Research vessel surveys are conducted annually in 3 inshore snow crab management areas in NAFO Div. 3L; Northeast Avalon (6C), Bonavista Bay (5A)

and Conception Bay. The surveys are carried out using commercial crab traps (in order to emulate those used in the fishery), small-meshed traps and a modified shrimp trawl. Traps are set at randomly selected stations stratified by depth. Weather permitting, traps were hauled after a 24 hr. soak and sampled in order to determine legal-sized catch per trap, size frequency, shell condition and proportion of small-clawed males (potential recruits). In 1996 bottom trawling was initiated in all areas. An attempt is made to occupy all stations with both types of traps and to tow for 10 minutes at each selected location. Trawl sets are sampled in the same manner as are trap catches. In Bonavista and Conception Bays there has been an increase in the proportion of small-clawed pre-recruit sized males in both small-meshed traps and the modified shrimp trawl. Bitter Crab Disease (BCD) remains a concern in both these bays, having increased in prevalence over 1998 levels. Although the impact of this disease on the snow crab fishery is unknown the fact that it is 100% fatal to infected animals is cause for concern.

Discussion

Although catch rates from large-meshed traps varied considerably among the 3 areas, they generally remained high, consistent with trends in commercial catch rates. Trends in time series of size frequencies from small-meshed traps and the modified shrimp trawl indicated that in both Bonavista and Conception Bays there was a large pulse of pre-recruit sized animals. These trapping/trawl surveys focus on deepest inshore strata (commercial ground) and therefore do not account for spatial effects. The small shrimp trawl catches very small crabs and continues to demonstrate potential for providing an early indication of year-class strength. Size frequencies for 1999 differed among the 3 areas.

Reference

WP SF 2000/10 Status of Newfoundland and Labrador snow crab in 1999 by E.G. Dawe, H.J. Drew, P.C. Beck, and P.J. Veitch.

Summary

Data on catch rate, size (carapace width, CW) and moult status (chela allometry and carapace hardness) from various sources, but especially fall multispecies bottom trawl surveys, were used to interpret resource status. The 1999 Div. 2GHJ3KLNO fall survey showed that males were broadly distributed throughout the survey area. They were virtually absent north of 2J, on the slope of the continental shelf deeper than about 800 m, and across most of the shallow southern Grand Bank. Legal-sized crabs predominated in catches at greatest depths near the shelf edge, smaller crabs predominated in shallower water,

especially near the coast, and a mixture of sizes occurred at intermediate depths over most of the shelf. Inshore strata were not included in the 1999 survey.

The overall Div. 2J3KLNO biomass index was relatively precise (+/- 14%), whereas divisional indices were variable and less precise. The 95% confidence intervals were widest for Div. 3N and 3O, probably due to an aggregated distribution of the resource near its southern limit. Estimates indicate that the fall residual biomass index of crabs 95 mm and larger (legal-sized), based on fall surveys, which was stable during 1996-1998, decreased 45% from 85,000 t in 1998 to 47,000 t in 1999. The fall survey biomass index of 76-94 mm small-clawed males (immediate prerecruits) decreased by 54% from 1998 to 1999. A 48% decrease in the exploitable biomass was projected for 2000 due to the decrease in residual biomass in 1999 and the projected decrease in recruitment for 2000. The ratio of the commercial catch to an exploitable biomass index, which was projected from the fall survey of the previous year, increased from 0.40 in 1997 and 1998 to 0.53 in 1999. Therefore, exploitation increased in 1999 but the absolute rate is unknown.

Size distributions reflect the decrease in biomass of crabs larger than 75 mm in 1999. Uncertainties exist regarding the efficiency of the Campelen trawl in sampling intermediate-sized crabs (40-75 mm) which would begin to recruit to commercial size about two years after the survey year. Therefore, it is not possible to predict recruitment to the exploitable biomass in the intermediate term. Abundance estimates of small crab (carapace width less than 40 mm) have declined in fall survey catches since 1995. Crabs of this size would begin to recruit to legal size about 4 years after the survey year. This may indicate a series of weak year classes that is expected to provide poor recruitment in the longer term.

The prevalence of bitter crab disease (BCD) in fall Div. 2J3KLNO surveys appeared to decrease in Div. 3KL and increase in 2J in 1999. September inshore trapping surveys in White Bay indicated that it is increasing in legal-size males relative to smaller males, especially in deepest strata.

Data were also available from spring multispecies bottom trawl surveys conducted in Div. 3P during 1996-1999. Generally, catches of legal-sized crabs were localized in the eastern portion of 3Ps. Biomass estimates were unreliable, highly variable, and trends could not be interpreted. This was attributed to a highly-aggregated distribution of the resource as well as seasonal effects. Size frequency distributions indicated that small-clawed crabs (not terminally-molted) are poorly-represented in trawl survey catches, probably reflecting low catchability for a period of time in spring surrounding the molt.

Comparison of crab size structure from at-sea sampling with that from dockside grading was inconclusive in indicating whether or not 'high-grading' (the practise, of discarding small legal-sized crab of lower commercial value) was practised in 1999.

Discussion

There was considerable discussion on the reliability of trawl survey catch rates of intermediate-sized males as an index of future recruitment, because this size group has been poorly represented in catches. However it was noted that annual trends in catch rates of this size group were consistent with trends in other male size groups. Also, similar annual trends were evident in comparably-sized mature females. This suggested that trends in catch rates of intermediate-sized males may prove useful for indicating future recruitment. However reliability of such an index remains uncertain at present because catchability of this group may be greatly affected by annual changes in distribution in response to changing population structure.

It was also noted that it was not possible to follow the progression of male modal size groups through the 1995-1999 time series of carapace width frequencies from Div. 2J3KLNO fall surveys. This suggested the existence of some major source of natural mortality in small crabs. It was noted that BCD could impose such mortality, particularly on small crabs, although its overall prevalence in samples has been low. It was recognized that BCD seems to be acquired at molting and so it would have a cumulative effect on any yearclass across successive molts, especially at small sizes when molting is frequent. Also, prevalence of this disease may be under-represented in samples from all sources.

Reference

WP SF 2000/11 Seasonal trends in the 1999 Newfoundland and Labrador snow crab fishery by E.G. Dawe, H.J. Drew, P.J. Veitch, P.C. Beck, D.M. Taylor, and P.G. O'Keefe.

Summary

Seasonal trends were examined toward inferring effects of fishing practices on discard mortality levels. The 1999 fishery was similar to that of the previous year in that most of the catch was taken early. Peak catches occurred in May of 1999, June of 1998, August of 1997 and July of 1996. Data from dockside grading in 1998 and 1999 indicated that incidence of new-shelled crab in landings was low throughout April-July. The month of peak new-shell occurrence varied, among divisions and between years, from August to November. Data from at-sea sampling by observers in 1999 showed that discarding increased above 20% in June (Div. 3PsLNO4R) or July (Div. 3K) and remained above 20%, occasionally exceeding 40%, throughout the fishing season. Discarding was lower in Div. 2J, not reaching 20% in any month. Biological data collected by observers indicated that seasonal trends in discarding closely reflected seasonal trends in prevalence of new-shelled crabs.

Discussion

Most of the discussion focused on the very high mortality levels indicated by the high discard levels. It was recognized that discard mortality on new-shelled crabs has been high and total discard mortality is further increased by discarding of sub-legal sized ('undesized') crabs and smaller legal-sized crabs ('highgrading'). Discard mortality could be greatly reduced by not fishing during the soft-shell season, but it was noted that this could not be fully implemented because of the broad duration of that season. More practical alternatives may include improved handling practices to reduce mortality on discards and removal of incentives to highgrade.

Iceland Scallops

Reference

WP SF 2000/12 A review of the 1999 Newfoundland and Labrador scallop fishery by K. S. Naidu, F. M. Cahill and E. M. Seward.

Summary

The Newfoundland fishery (1999) for the Iceland scallop in three management areas was summarized. These include the Strait of Belle Isle (NAFO Div. 4R), Grand Bank (NAFO Div. 3LNO) and St.Pierre Bank (NAFO Subdiv.3Ps) respectively producing 35, 5 and 39% of the nominal catch in 1999. The remaining 21% was drawn from coastal Labrador.

Overall landings have declined from record levels in 1996-97. Much of the fishing effort directed at the species has been diverted into crab and shrimp. Total landings estimated at 3,016 t in 1999 was down sharply from the previous year (-54%). By area the declines were: -70% (3LNO); -60%(3Ps). In the Strait of Belle Isle(NAFO Div.4R), 1,046 t out of a TAC of 1,100 t was recorded. Nominal catch from the Labrador was also down from 1998(-46%). Pre-emptive catch limits for aggregations where there is no scientific information continues to be high.

There was no directed fishery in the Canada-France trans-boundary area of Subdiv. 3Ps. As reported last year much of the biomass here has been destroyed by predatory starfish.

There were no research vessel surveys into NAFO Subdiv. 3Ps, NAFO Div. 3LNO and NAFO Div. 2HJ. The primary focus of a research mission to 4R in 1999 was to reconcile long-standing differences of opinion regarding pre-recruit (< 60mm) abundance over the entire area. On the basis of two surveys into the area(one each in 1995 and 1997), DFO had cautioned that there was little incoming recruitment in the area. Area fishers had contended otherwise. In yet

another attempt to demonstrate the paucity of pre-recruits, the continuation into 1999 of the 1,100 t TAC from the previous year had been conditional upon: (a) provision by area fishers of precise fishing coordinates where seed scallops are purportedly abundant, (b) fisher participation in a dedicated pre-recruit DFO survey in May 1999, including the provision of the traditional fishing gear used by area fishers, (c) the reinstatement of the conversion factor of 9.2 temporarily abandoned in 1998 to convert meat weights to round weights, (d) assisting DFO in the placement and retrieval of spat collectors, (e) establishment of refugia and (f) partitioning of the 1999 TAC equally to the north and south of 51 25"N. Only three of the six conditions were met, viz. (a), (b), and (c).
Coordinated by the Fish, Food and Allied Workers Union (FFAW), two fishers nominated by the Union participated in the mission. Thirty-five fisher-provided locations were fished with the commercial gear commonly used in the Strait's area. The tows in areas reportedly containing an abundance of pre-recruits again failed to locate them in significant numbers. Overall, they contributed to only 1.4% of the total numbers caught(76 out of 5,321) and 0.2% of the the total weight (1.14 out of 581 kg). Additional randomly generated sets over the entire area with research gear, some in never-before fished locations, failed to support anecdotal reports of the abundance of pre-recruits in the area. Two new commercial deposits to the north were discovered, however.

Overall, observations on scallop size composition in 4R were quite similar to those made in 1995 and 1997, Scallops throughout the area consisted of large(old) animals. Mean and modal sizes (shell height) suggest that size distributions have remained unchanged over a 5-year period. These observations are corroborated by data assembled by at-sea observers in 1999.

Typically, scallops in the Strait's area show a history of encounters with fishing gear. Sub-lethal events are indelibly recorded on scallop shells as "shock" or "stress" rings. Overall, their incidence varied from 31% to as high as 71%, indicating intense past fishing activity in the area.
Discussion

It was noted that in 1999 there was some relief from the intense fishing pressure recently directed at the Iceland scallop. With the exception of the Strait of Belle Isle, the number of vessels prosecuting scallops had declined significantly. Catch limits for most areas were not met.While much of the effort had been diverted into shrimp and crab it is impossible to quantify the shifts.

Much of the discussion centered around the fishery along the Strait of Belle Isle, especially the continued attempts to reconcile long-standing differences of opinion between Science and area fishers on the abundance of juvenile scallop.

Discussion also took place around the two new aggregations discovered in the Strait in 1999. It was pointed out that these are likely to be targetted next thus continuing the pattern of sequential depletion here as already evident elsewhere

in the Region. Contribution of these deposits to the overall biomass was unknown and will have to await a survey proposed for 2000.

New data were presented on the frequency of encounters between scallops and fishing gear in 4R. There was considerable interest in this method of gauging past fishing activity.

Progress on Research Recommendations for 1999

1. After comparing estimates of shrimp biomass/abundance from multispecies trawl surveys using STRAP and OGMAP, it was proposed that, in future, OGMAP be the primary analytical tool for survey data. This proposal was accepted, conditional on the recommendation that implications for abundance-at-length estimates be investigated.

   A working paper entitled "Comparison of methods for constructing abundance-at-length estimates from research trawl surveys" showed that composite length frequency distributions for male and female shrimp produced both by STRAP and OGMAP methods were virtually identical in seven examples. It also was demonstrated that abundance-at-length representations were insensitive to several different methods of pooling.

Research Recommendations for 2000

1. Improve estimates of bycatch and discards in shrimp fisheries through improved observer coverage and use of DMP and logbook data.

2. Undertake review of crab fishery databases with a particular focus on the possibility of developing a standardized catch rate series from the logbook database.

APPENDIX I

Shellfish RAP Meeting

February 29-March 2, and March 8, 2000

List of Working Papers

WP SF 2000/

01 Bycatch of Greenland halibut in the offshore northern shrimp fishery by D. Orr

02 Discards of Shrimp in the Northern Shrimp Fishery by D. Orr

03 Comparison of methods for constructing abundance-at-length estimates for shrimp from research trawl surveys by D.G. Parsons.

04 Assessment of shrimp in Hawke + 3K (SFA 6) by D. G. Parsons et al.

05 Assessment of shrimp in Hopedale + Cartwright (SFA 5) by D. G. Parsons et al.

06 Assessment of shrimp in Div. 2G (SFA 4) by D. G. Parsons et al.

07Assessment of shrimp in Div. 0B (SFA 2) by D. G. Parsons et al.

08 Assessment of the 1999 Newfoundland and Labrador snow crab fishery

by D. M. Taylor et al.

09 Summary of the results of 3 inshore/nearshore snow crab trapping/trawling surveys by D. M. Taylor et al.

10 Status of Newfoundland and Labrador snow crab in 1999 by E. G. Dawe et al.

11 Seasonal trends in the 1999 Newfoundland and Labrador Snow Crab Fishery by

E.G. Dawe et al.

12 A review of the 1999 Newfoundland and Labrador scallop fishery by K.S. Naidu et al.

List of Other Documents

Oceanographic conditions in NAFO Subdivisions 3Pn and 3Ps during 1999 with comparisons to the long-term (1961-1990) average by E. Colbourne.

Oceanographic conditions in NAFO Divisions 2J 3KLMNO during 1999 with comparisons to the long term (1961-1990) average by E. Colbourne.

Forecasting fishery performance for northern shrimp (Pandalus borealis) in NAFO Divisions 2HJ. NAFO SCR Doc. 99/100, 13 p. by D. G. Parsons.

A non-parametric method of estimating biomass from trawl surveys with Monte Carlo confidence intervals. NAFO SCR DOC 99/72, 8 p. by G. Evans et al.

Was the increase in shrimp biomass on the northeastern Newfoundland Shelf a consequence of a release in predation pressure from cod? by G. R. Lilly et al.

Trends in spring and winter research CPUE of shrimp in Hawke Channel, 1994-2000 by G.A. Rose and W. Hiscock.

APPENDIX II

List of Attendees – Shellfish RAP 2000

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APPENDIX III

Briefing Notes:

BRIEFING NOTE

ISSUE:

Status of northern shrimp (*Pandalus borealis*) off Newfoundland and Labrador

BACKGROUND:

- The regional review of northern shrimp resources in four management areas was held during February 29 - March 2, 2000. The meeting included industry representatives.

- The assessment included data from the commercial fishery in 1999 and previous years and research trawl survey data from 1995 to 1999.

CURRENT STATUS:

- **Hawke Channel + Division 3K (SFA 6)**

  Catch rates for the offshore fleet increased up to 1995 and have since remained relatively stable at a high level. Research survey biomass/abundance indices also were stable during the 1996 - 1999 period. The survey data further show that the 1995 and, especially, the 1996 year classes are weaker than those of 1993 and 1994. However, the 1997 and 1998 year classes appear stronger than the 1995 and 1996.

  The resource in this area is currently healthy with high abundance of males and females. Residual female biomass and stronger 1997 and 1998 year classes should buffer the effects of the weak 1996 year class for the next few years. Recent catches have had no observable impact on the stock and removals at the current level will not likely increase the exploitation rate.

  No reliable catch rate index or catch sampling data are available from the inshore sector which accounted for two-thirds of the nominal catch in 1999.

- **Hopedale+Cartwright Channels (SFA 5)**

  Catch rates for offshore vessels increased during the 1990's, stabilizing at a high level from 1997 to 1999. Research surveys from 1996 to 1999

produced indices of biomass/abundance that showed a decline from 1996 to 1998 and an increase in 1999. Wide confidence intervals are associated with the point estimates in this area, especially in 1996, reflecting uncertainty. Research sampling data indicated that the spawning stock (females) should be maintained in 2000 by the 1993 and 1994 year classes.
Current status appears favourable from the fishery data and research surveys indicate a healthy female component. Prospects beyond 2000 are uncertain because the lack of a recruitment index does not allow projection. Recent catches have had no observable impact on the stock and removals at current levels will not likely increase the exploitation rate.

The biological basis previously used to separate SFA's 5 and 6 for assessment purposes appears to be no longer valid. Future stock assessments will consider the implications of treating both areas as a biological unit.

- **Division 2G (SFA 4)**

Catch rates for offshore vessels fluctuated without trend since 1991 and there was no significant difference in estimates from 1997 to 1999, reflecting stability in the resource since 1997. Biomass/abundance indices for 1997 and 1999 from depths greater than 200 m were similar and higher than observed in 1996.

Current status is favourable. The fishery data indicate a high abundance of females and research data indicate a healthy spawning stock. Prospects beyond 2000 are uncertain because the lack of a recruitment index does not allow projection. Recent catches have had no observable impact on the stock.

- **Division 0B (SFA 2)**

Catch rates for offshore vessels increased from 1993 to 1998 and declined in 1999 to the level observed in 1997. Knowledge of the biology, distribution, abundance and exploitation of shrimp off Baffin Island is lacking in the absence of a time series of research trawl surveys. Fishery data alone cannot be interpreted as an indication of trend in the stock. Nevertheless, because recent catch rates have been high over a large area, industry considers that the stock is healthy.

Lack of data creates uncertainty in understanding the current state of stock distribution, delineation and exploitation level and prospects beyond

2000 also are unknown. Under data-poor conditions, it is difficult to evaluate the impact of recent catches.

The basis previously used to separate SFA's 2 and 4 for assessment purposes is no longer valid. There is no new biological information from these northern areas to provide a basis for redefining stock boundaries. Industry has requested modification of the boundary lines that separate SFA's 2, 3 and 4 near Resolution Island.

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BRIEFING NOTE

ISSUE

Status of Newfoundland and Labrador Snow Crab (Chionoecetes opilio)

BACKGROUND

- The regional review of Newfoundland and Labrador snow crab was held on February 29-March 2, 2000.
- The assessment included data from the commercial fishery in 1999 and previous years, research trawl survey data from 1995 to 1999, and inshore trap survey data from 1979 to 1999.
- It is expected that the final stock status report will be available on or about March 24.

CURRENT STATUS

- Landings have increased steadily from the late 1980's to 52,000 t in 1998. They further increased by 33% to a record high of 69,200 t in 1999.

Division 2J3KLNO

- Landings increased from 6,000 t in 1987 to 44, 400 t in 1998. They further increased by 33% to 59,600 t in 1999 due to TAC increases. TAC's have been reached each year.
- The number of trap hauls more than doubled from 1987 to 1998. It further increased by 35% in 1999. New effort is primarily due to vessels <35 feet with temporary seasonal permits. Effort has been broadly distributed in recent years indicating that commercial concentrations exist over a broad area.
- Commercial catch rates increased in the late 1980's and early 1990's and have remained high in recent years. Spatial expansion and other changes in fishing practices may have helped to maintain catch rates in recent years.
- The fall bottom trawl survey, which is executed near the end of the fishery, indicates that the resource is broadly distributed throughout the survey area. This reflects a large area of suitable habitat. The residual biomass index based on fall surveys, which was stable during 1996-1998, decreased from 85,000 t in 1998 to 47,000 t in 1999.

- The ratio of the commercial catch to an exploitable biomass index, which was projected from the fall survey of the previous year, increased from 0.40 in 1997 and 1998 to 0.53 in 1999. Therefore exploitation increased in 1999.

- The fall survey biomass index of 76-94 mm small-clawed males (immediate prerecruits) declined by 54% from 1998 to 1999.

- A decrease in the exploitable biomass is projected for 2000 due to the decrease in residual biomass in 1999 and the decrease in recruitment for 2000.

- Males 40-75 mm are not well-represented in survey catches. Therefore, there is uncertainty regarding their contribution to recruitment in 2001.

- Male crabs smaller than 40 mm have steadily declined since 1996. This may indicate a series of weak year classes that will provide poor recruitment beyond 2001.

- The biomass of mature females, which is unaffected by the fishery, has also declined based on surveys that began in 1995.

- The causes of declines in commercial biomass and future recruitment include increased exploitation, discard mortality, bitter crab disease, environmental warming, and cannibalism.

Division 3Ps

- Landings increased from 600 t when the fishery began in 1987 to 6,600 t in 1998. They further increased by 20% to 7,900 t in 1999 due to TAC increases. TAC's have been reached each year.

- The commercial catch rate was relatively stable during 1987-1991 and increased steadily through the 1990's.

- Bottom trawl surveys in Division 3Ps are unreliable for interpreting trends in biomass because these surveys are executed in spring when molting occurs, and a large portion of the population is poorly represented in survey trawl catches.

- Resource status and future prospects are uncertain because of the lack of reliable survey data.

Division 4R

- Landings increased from 650 t when the fishery began in 1994 to 1,060 t in 1998. They further increased by 52% to 1,610 t in 1999 due to TAC increases. TAC's have not been reached in some years.
- The commercial catch rate in Division 4R has remained at a lower level than in other divisions.
- There are no research data available from this division.
- Resource status and future prospects are uncertain because of the lack of any fishery-independent data.

PRESS LINE

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Date: March 13, 2000

BRIEFING NOTE

ISSUE: **Status of Iceland scallop (Chlamys islandica) in Newfoundland and Labrador**

BACKGROUND

- The Newfoundland and Labrador regional review of Iceland scallop resources was held March 8, 2000.
- Included in the review were data from the Strait of Belle Isle (NAFO Div. 4R), Grand Bank (Div. 3LNO), and St. Pierre Bank (Subdiv. 3Ps) fisheries and from a joint fisher/Science, Oceans and Environment research survey in 4R.

CURRENT STATUS

Combined nominal catch from Newfoundland and Labrador in 1999 declined further to 3016 t (round) from levels recorded in the two preceding years (11,211 t and 6,570 t, respectively in 1997 and 1998). Much of the effort directed into this species has been diverted into crab and shrimp.

Divisions 3LNO

- In 1999, only six vessels participated in the scallop fishery over the Grand Banks, down from 21 the previous year, a decline of 70%.
- The catch of 138 t represents a decline of 90% from 1998. The majority (97%) of the catch was drawn from aggregations around the Lilly Canyon and Carson Canyon (NAFO Div. 3N). Catch rate (74 kg/tow) has levelled off, but down 25% from 1995, when deposits here were first commercialized.

Subdivision 3Ps (Canadian Zone)

- The overall 1999 catch here dropped by almost 60% compared with the previous year (1,188 t vs. 2,763 t).
- Near-shore aggregations (Perch Rocks) produced the bulk (478 t or 40%) of the catch from this area. Catch rates in 1999, however, dropped by 30% from the previous year.
- Western St. Pierre Bank recorded a 90% decline in catch from 1998 (51 t from 508 t).

Canada/France Transboundary area of Subdiv. 3Ps

- There was no fishery in this area in 1998 and 1999.

NAFO Div. 4R (Strait of Belle Isle)

- The catch limit here was set at 1,100 t, split equally between north and south of 51^0 25'N.
- The nominal catch in 1999 is estimated at 1046 t. The bulk of the removals, estimated at 704 t (or 67%), came from the area south of 51^0 25'.
- Overall, CPUE for the entire area in 1999 dropped 11% to 30 kg/tow from 34 kg/tow in 1998.
- Three sources of information (research survey, fisher and observer) in 1999 indicated little incoming recruitment.
- Research vessel sets over the Strait of Belle Isle, some in never-before-surveyed locations, led to the discovery in 1999 of two new aggregations to the north.
- In light of the continued absence of significant recruitment, the fishery continues to deplete standing stock biomass. Longer-term sustainability at current catch levels is unlikely.

Labrador

- There is no scientific information from this area.
- Landings were down from 1998 (644 t vs. 1190 t), a decline of 49%.
- Overall management perspectives for scallop
- The long-term management strategy for scallops should be re-evaluated through dialogue among Science, Oceans and Environment, Management and stakeholders. Stakeholders should be fully apprised of the consequences of the current harvesting practice for the resource.

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